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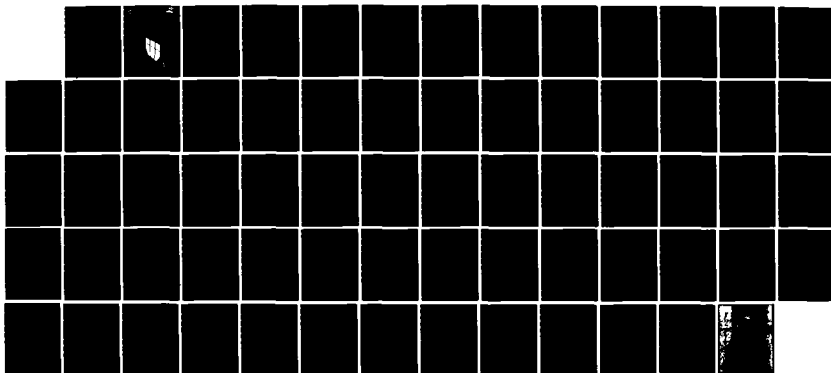
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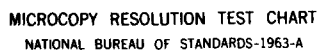
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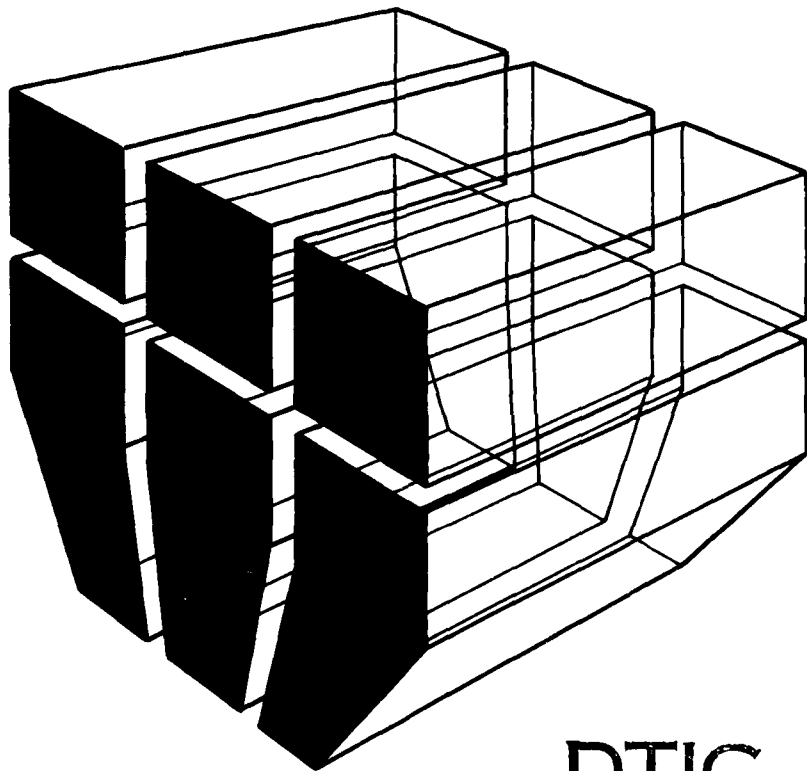


**INTERIM REPORT P-157
August 1984**

AD-A145 075

**A CONCEPT DESCRIPTION FOR A DIRECTORATE OF ENGINEERING
AND HOUSING DECISION SUPPORT SYSTEM (DEH DSS)**

by
**Alan W. Moore
Janet R. Randle
Simon J. Kim
Robert E. Buhts**



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ABSTRACT (Continue on reverse side if necessary and identify by block number) - U.S. Army Construction Engineering Research Laboratory (USA-CERL) re- searchers studied the existing Directorate of Engineering and Housing (DEH) automated environment and proposed four components for a Decision Support Sys- tem (DSS): (1) information, (2) hardware, (3) software, and (4) telecommuni- cations. DEH activity requirements were then examined to learn what specific equipment would be needed to satisfy the four components. Parallel DSS re- search at the Office of Assistant Chief of Engineers made selection of the equipment easier. (Continued on next page)		

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→ A three-step approach was devised to accomplish the DSS. First, personal computers (PCs) would be installed in a target office, using off-the-shelf software, and a support center would be set up for help. Second, a Local Area Network (LAN) would be installed to link interoperation facilities and remote databases. Finally, Function Oriented Systems (FOSs) would be connected to take advantage of data in PCs and existing hardware, software, and communications.

↖ A field test of the approach is being conducted at Fort Leonard Wood, MO, in an agreement with USA-CERL. Once the capabilities of off-the-shelf products are evaluated, a generic DEH DSS implementation plan will be proposed for Army-wide use.

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FOREWORD

This work was performed for the Office of the Chief of Engineers (OCE), Office of the Assistant Chief of Engineers (OACE) under RDTE Project 4A162731AT41, "Military Facilities Engineering Technology"; Task A, "Facilities Planning and Design"; Work Unit 063, "Military Construction Program Management/Decision Support System." The applicable Requirement Code is STO 81-8:6. The OCE Technical Monitor was Mr. George Braun.

This investigation was performed by the Facility Systems (FS) Division of the U.S. Army Construction Engineering Research Laboratory (USA-CERL). Mr. Edward A. Lotz is Chief of USA-CERL-FS.

COL Paul J. Theuer is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

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A CONCEPT DESCRIPTION FOR A DIRECTORATE
OF ENGINEERING AND HOUSING DECISION
SUPPORT SYSTEM (DEH DSS)

1 INTRODUCTION

Background

The Directorate of Engineering and Housing (DEH) is responsible for management of a wide variety of resources, and is engaged in some of the most important, visible work on Army installations. Without DEH support, Army installations would rapidly deteriorate, leaving few acceptable places for forces to operate, train, communicate, be housed, receive medical care, and store and maintain equipment. The DEH has one of the most valuable support roles in the Army, since how well it carries out its activities directly impacts the readiness and effectiveness of the Army.

The number and variety of DEH resources, as well as increased demands for productivity, require efficient, effective management. Quick access and flexible manipulation of information about DEH resources are keys to the quality management desired. Past automation support for DEH activities has led to a variety of programs/systems with different hardware support* resulting in a sometimes confusing selection. Existing procedures for manipulating, processing, transmitting, and presenting DEH information are not uniform nor do they provide enough flexibility or communication among programs/systems. More automated applications are being developed, some existing systems are being redesigned, and a major acquisition (Project Vertical Installation Automation Baseline [VIALE]) of computer support will dramatically improve installation/DEH computing power. However, if unique DEH computer applications not available on VIALE are not specifically identified, coordinated, and planned for, the DEH will not have adequate support.

The identification of DEH automated applications and a coordinated structuring of accessing, using, and communicating with existing and proposed systems and computer support is required to insure that the potential of DEH automated support is realized. The DEH Decision Support System (DSS) concept identified in this report is designed to provide this capability.

Objective

The objective of this report is to identify DEH DSS requirements and define a DSS concept that can satisfy these requirements. Toward this end, the report describes: (1) aspects of the existing DEH automated environment, (2) a DSS concept, and (3) required development activities.

*Integrated Facilities System [IFS]--INSTL mainframe; Facilities Engineer Supply System [FESS]--Four Phase; Environmental Technical Information System [ETIS]--University of Illinois computer; DD Form 1391 Processor--TYMSHARE.

Approach

Current automated technology in DEH and improvements planned through Project VIABLE and Integrated Facilities System-Redesign (IFS-R) were studied. A DEH DSS was defined and expanded on. Then specific DEH activities were examined to determine what hardware/software/communications equipment is needed to accomplish them. An agreement was entered into between USA-CERL and Fort Leonard Wood to field test the DSS approach

Scope

To insure that DEH DSS Development activities do not violate the spirit of official Department of the Army (DA) policy on automated developments, the DEH DSS will not duplicate, replace, nor require changes to the hardware or software of existing or planned automated systems/programs (e.g. VIABLE, IFS-R, and others).

The DEH DSS is being developed to give integrated, automated, capabilities not being provided through VIABLE, IFS-R, and FESS. Graphical display, electronic spread sheets, word processing (WP), and telecommunications will be addressed and fully integrated to supply the full range of information manipulation needed by DEH managers.

Mode of Technology Transfer

The results of this study will be published in a subsequent USA-CERL Technical Report. In addition, it is planned that the DEH DSS strategic support center will maintain a DEH microcomputer knowledge-based system which installations may access. From this knowledge base system installation personnel will be able to download application software directly to their microcomputers. No disks will have to be transferred. Also at the knowledge base will be user manuals, self-tutorial training aids, and a message system to communicate with other DEH users.

2 DEH AUTOMATED ENVIRONMENT

Overview

While DEH operations and functions will not change dramatically in coming years, their ways of support will--especially in the area of automated office technology and computer support. Much is being done to provide the DEH with better information, faster and easier. This is being done through redesign of existing automated systems and enhanced computer support through project VIABLE.

The biggest impetus for change stems directly from the threat of contracting out most DEH functions. As DEH managers seek ways to be competitive with civilian contractors, they examine tools commonly used by the business and engineering communities which make the workforce more productive. The tools invariably involve automated technology and computer support, i.e., micro or personal computers with powerful software packages. When compared with private industry, existing DEH automated support does not measure up. No other business of comparable size, with responsibility for management of the same variety of functions as the DEH, would survive without extensive use of automated office technology and computer support. Army leadership recognizes this fact and is accomplishing much to provide the DEH organization with its required automated capability.

The Army commitment to employ modern automated technology in the DEH organization will create a much more sophisticated office environment, unfamiliar to most of the DEH workforce. Adapting the existing workforce to this new environment will present a challenge to Army management because many DEH workers are fearful and distrustful of automated/computer support.

Existing Automated Environment

Most of the DEH workforce's experience with automated/computer support has been through contact with reports generated by IFS and FESS. Also, DEH master planners and environment management personnel have additional exposure to the DD Form 1391 Processor and ETIS. But since there are only one or two master planning/environmental personnel at each DEH organization, it is safe to conclude that when automated systems are mentioned, the workforce's reference is IFS. Unfortunately, capabilities planned for IFS are only slowly materializing, leaving the DEH workforce with doubts about the potential benefit of automated systems.

Although many of the opinions held by the DEH workforce about automated support have been shaped by their experience with IFS, age and education also affect workers' perceptions about automated support. Regardless of which installation is visited, there are many older (50 and above) personnel throughout the DEH organization. Furthermore, with the exception of personnel in the Engineering Plans and Services (EP&S) Division, most workers are blue collar and clerical, without college educations. Older workers in trade and clerical occupations are generally computer novices, who tend to be intimidated if made to interact with a "smart" machine which they might perceive as competing for their job. Avoidance is the customary response.

Also negatively affecting the workforce's perception of computer support is the fact most systems were imposed from above. This was often done with limited training and insufficient explanation about why the systems are needed by higher echelons. The worker who was required to feed information in could not see the benefit to himself/herself since, in many cases, the reports generated by automated systems are of no value to the person generating the data. Data collection thus becomes a burdensome requirement of unperceived value. At other times, the information takes so long to get back to the gatherer that he/she must keep separate manual records. This poor computer response time just adds to the belief that computer systems are of questionable value.

The problem of computer response time is directly related to the outmoded installation Base Operations (BASOPS) hardware (an IBM 360 or equivalent) which supports DEH automated systems. About 20 years old, this equipment has become heavily saturated due to the proliferation of automated programs/systems installation-wide. Computer funds for each organization have been severely cut, and the installation's Automation Management Officer (AMO) has become overwhelmed with programming requests for corrections, enhancements, and modifications to existing systems and programs.

Pending Improvements

The two initiatives designed to overcome the problems mentioned above and which will have the most dramatic impact on DEH automated support are Project VIABLE and IFS-R.

Project VIABLE

Project VIABLE is an Army-wide effort to obtain modern and efficient Automated Data Processing (ADP) technology to replace current installation BASOPS equipment installed in the 1960s. VIABLE hardware and software will provide installations with far greater computing power and access to a large quantity of efficient software that would be economically infeasible for those installations to procure individually. Saturation problems should cease immediately and programming capabilities be should enhanced significantly through access to the new software.

In addition, the project contractor (Electronic Data Systems [EDS]), is providing a monthly report on new technology marketed by private industry. If, on review, it is applicable to and approved by the Army, it will be incorporated into the VIABLE configuration. This will insure that Army installations' computer service support will remain state-of-the-art.

Furthermore, the VIABLE project manager has informed USA-CERL that support will be given to any DEH automated requirement that is identified, through acquisition of necessary hardware/software additions. This support commitment is particularly essential for DEH organizations, since a detailed analysis of future DEH automation needs has not been made.

The basic concept of VIABLE is that of an integrated network. Five Regional Data Centers (RDCs) throughout Continental United States (CONUS), together with 70 Data Processing Installations (DPIs) at previously selected CONUS installations, will enable terminal users (50 to 600 per installation) to transfer or access data (as authorized) throughout the entire network. A list of the RDCs, DPIs, and their scheduled hardware delivery dates can be found in Appendix A. Figure 1 shows a general schematic of the hardware that will be available at each of the RDCs and DPIs.

Each RDC will have multiple Amdahl 470 Central Processing Units (CPUs), Storage Technology Corporation disk drives and printers, and NCR Comten front end processors. This hardware will communicate and interface with an IBM 4331 central processor at the local site 1, which itself will be supporting hundreds of Raytheon terminals (Courier terminals will be used if classified information will be processed). The contract calls for these terminals to be hardwired with no dial-up capability. Realizing the user's need to access systems not yet scheduled to be on the VIABLE network (DD Form 1391 Processor, FESS, ETIS, Pavement Management System [PAVER]) personnel at VIABLE Project Management Office (VPMO) are investigating methods of providing dialup capability to the user. No decision has yet been made on the solution to this problem.

Appendix A lists all software that will be on VIABLE to support Major Army Command (MACOM) and installation efforts. VIABLE will provide no word processing capabilities. Also, no indication has been given that a graphics software package will be provided.

IFS-R

IFS, the most-used DEH automated information system, is now undergoing redesign by the Facilities Engineer Support Agency (FESA). IFS is run in a batch mode on installation BASOPS equipment. As originally configured, IFS was to consist of three increments, subdivided into five modules:

<u>Increment</u>	<u>Module</u>
I Management (Real Property Management System)	1. Facilities Engineering Management System (FEMS)
	2. Assets Accounting (AA)
	3. Real Property Maintenance Activities (RPMA)
II Facilities Planning	4. Facilities Planning
III New Construction	5. New Construction

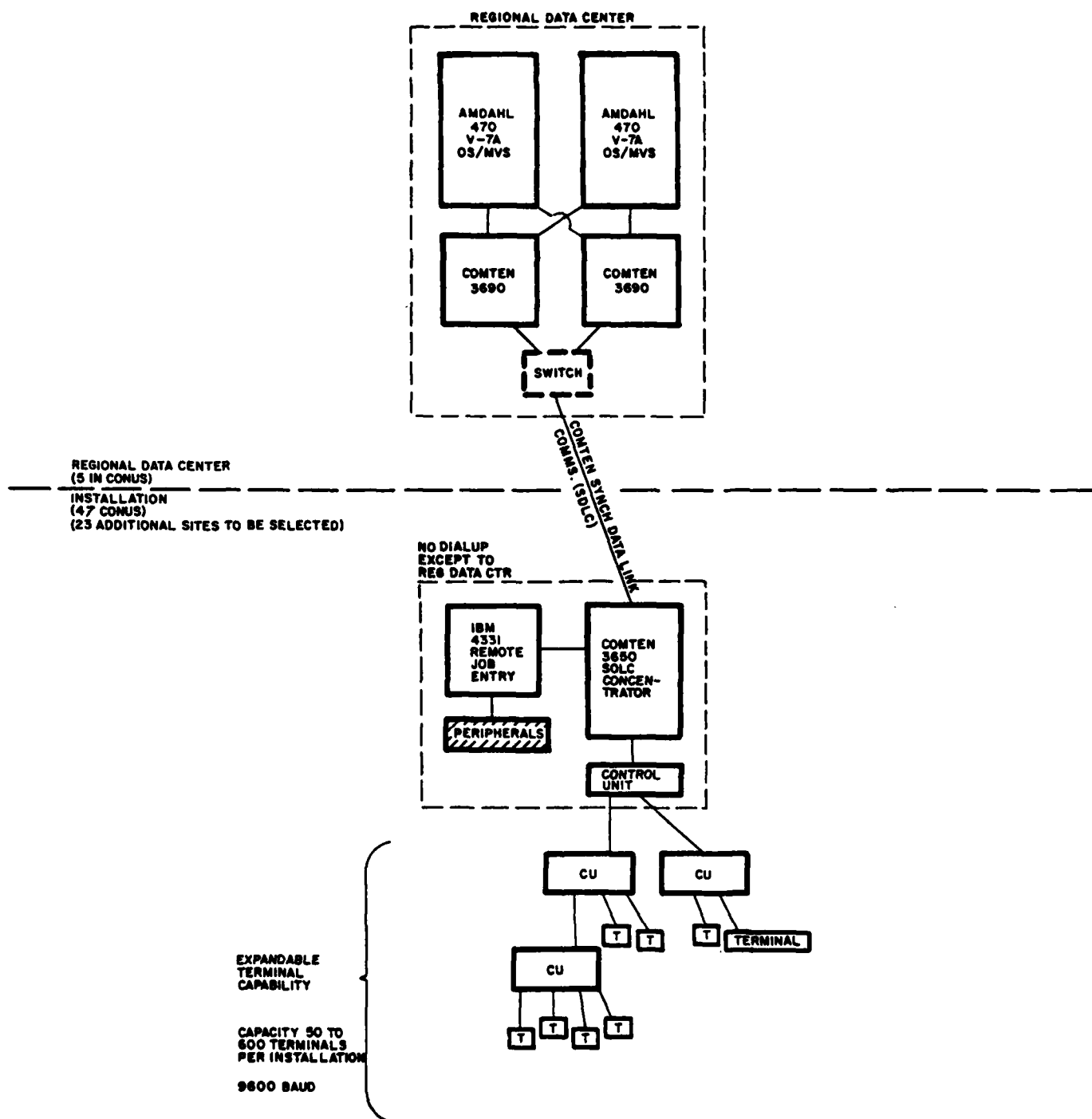


Figure 1. VIABLE hardware schematic.

Of the three increments, only Increment I and its modules now exist. This increment and the attendant modules were designed to support the four major functions of Real Property Maintenance Activities (RPMA):

<u>Functions</u>	<u>Module</u>
Work Management	FEMS
Cost Accounting	FEMS
Real Property Inventory Management	AA
Planning, Programming, Budgeting, Execution, and Review (PPBER) Cycle	RPMA

The Facilities Engineering Management System (FEMS) is designed to provide the tools needed for effective day-to-day management of facilities engineering operations at the installation level. The functions supported are:

Work Reception	
Estimating	
Engineering Design	
Material Coordination	Work Management
Scheduling	
Work Accomplishment	
Performance Evaluation	
Financial Control	Cost Accounting

The AA module is the inventory database of the IFS. All other portions of the systems interface in some manner with the AA, either by obtaining data, providing data, or verifying data. No work may be recorded in the FEMS until a record of the facility exists in the AA. Inspection data from the RPMA module cannot be entered if the facility does not exist in AA. The Assets portion of the system also provides reports in the areas of inventory, use, and force and mission planning. The objectives of the AA module are:

1. To provide a single source database for IFS, including: inventory of all real property by installation, facility-related base data, history of expenses by facility by event, use and condition of facilities
2. To provide facility planners and managers with: facility-related information about force and mission planning, available capacities, availability of facilities by type, and installation facility readiness.

The RPMA module is composed of two sections. The first collects data consisting of inspection requirements and of costs other than those collected in FEMS. The second section contains the four major report groups which support the PPBER cycle:

1. The Unconstrained Requirements Report (URR)
2. The Financed/Unfinanced Requirements Report (FURR)

3. The Mid-Year Review Report (MYRR)

4. The Prior Year Performance Report (PYPR)

Today, IFS is operational at some 70 Army installations worldwide. Extension plans for FY83 included Development and Readiness Command (DARCOM) and several European installations. A major systems change is being developed, in conjunction with the Army's Project VIABLE, to provide limited interactivity (Data Entry, File Inquiry [DEFI]) to system users. This capability will be enacted with the VIABLE extension schedule and will serve the IFS community until the IFS-Redesign is extended.

The current batch mode IFS is supported by 20 year-old ADP technology, and at most installations has received insufficient processing support because of ADP hardware saturation. Major disadvantages frequently cited by users are:

- Too much user manpower required to maintain data and operate the batch system
- Turn-around of data in the batch system too slow, particularly when ADP saturation causes delays in processing
- Lack of ready accessibility to data in IFS files
- Lack of capability to select and manipulate data. System changes take too long to incorporate.

In contrast, IFS-R will provide the Army installation DEH with an interactive, responsive management information system. The U.S. Army Project VIABLE is aimed at providing state-of-the-art ADP capabilities (interactivity, database management, realtime) to users of standard systems such as IFS. To take advantage of the new technology/hardware and to meet changes in user needs, IFS has undergone a redefinition. Though there are numerous changes in support requirements for the individual functional areas in IFS-R, the most significant change from the batch system will be the user/system interface. The fully interactive redesigned system will provide for Cathode Ray Tube (CRT) terminal data entry, editing, and immediate file update; it will allow, through an English-like language, inquiries directly to the files for standard or special requirements with screen displays and/or printed output. Project VIABLE is applying a Database Management System (DBMS) technology to IFS-R which will result in simplified software management and more responsive systems maintenance capability.

IFS-R addresses 13 facilities engineering and housing functional areas:

Administrative Office
Operations Office
Engineering Plans and Services
Engineering Resources Management
Shop Administration
Cyclic Maintenance Scheduling
Supply Management
Executive Level Information

Buildings and Grounds Management
Environmental Management
Housing Management
Utilities Management
Fire Prevention and Protection.

The functions, when programmed, will provide a means to obtain, manipulate, store, and distribute accurate management information throughout the DEH organization. Although the basic structure of the IFS-R is common to all users, the specific or unique requirements of each user are provided for in the design.

The IFS-R will be implemented in steps to take early advantage of the interactivity capability made available by Project VIABLE. The first package to be broadcast to systems users will address the following functions:

Engineering Resources Management
Shop Administration
Engineering Plans and Services
Executive Level Information.

The specific areas of Real Property Inventory, Job Cost Accounting, Work Management, and Contract Management will be included as integral parts of the first package functions. Functions not addressed in the first package will be scheduled in subsequent packages as directed by the Configuration Control Board.

IFS-R will be installed at 47 CONUS installations, including Alaska, Panama, and Hawaii. Also, Project VIABLE has an option of 23 additional sites (installations) which, if exercised, would include IFS-R. Extension of Project VIABLE ADP equipment (ADPE) began in April 1983 at the rate of two installations per month. Based on 47 installations, the VIABLE ADPE extension program should be completed in April 1985. Exercise of any of the 23 optional sites will extend the completion date accordingly. When IFS-R is programmed and ready to extend, it will be fielded in conjunction with the remaining Project VIABLE ADP extension schedule. Once VIABLE ADPE is fully extended, the IFS-R system will then be extended to those installations that received VIABLE ADPE before the IFS-R system was ready for extension. Extension of IFS-R will be conducted by functional and technical assistance teams staffed by the various agencies and headquarters affected (FESA, U.S. Army Computer Support Command [USACSC], MACOMs). Because of the extension plan, many installations may not receive IFS-R capabilities until 5 years from now.

Other FESA Initiatives

Besides FESA's efforts to redesign IFS, much work is being done to enhance the use of DEH Four Phase minicomputers. Four Phase minicomputers were originally installed at DEH organizations to support use of FESS. But operation of FESS does not require full use of Four Phase capabilities, resulting in excess capacity. This excess capacity has recently been used to support word processing, budget commitment blotters, the Integrated Facilities Data Entry Process (IFDEP), and the work performance standards portion of the Facilities Engineering Job Estimating (FEJE) system.

IFDEP, perhaps the most important, allows for interactive preprocessing of IFS data. IFDEP provides data entry editing, as well as files of current service orders and individual job orders (IJOs). This capability is being provided to 49 installatin DEHs on an interim basis before VIABLE.

Another FESA endeavor is the development of the Housing Operation Management System (HOMES). HOMES is an automated housing information system which will encompass most housing activities. The first HOMES module fielded is the assignment and termination of family housing, with other modules scheduled for development.

USA-CERL Initiatives

At USA-CERL, support of the DEH is ongoing to improve existing automated systems (ETIS, PAVER) and develop new systems, i.e., Commercial Activities System (CAS), Geographic Information System (GIS), Paint Management System (PMS), and others (see Figure 2). In addition, office automation technology is being investigated to integrate it with existing CE automated systems (the USA-CERL OACE Office Automation Study).

To insure that USA-CERL-developed programs/systems can be fielded in an integrated manner and complement one another, a USA-CERL DEH DSS Steering Group has been formed to guide DEH DSS development activities.

The OACE Office Automation Study has been particularly timely and helpful. As a result of the study, much information was gleaned about total system design considerations, development of requirements, acquisition and maintenance costs, training and training costs, and assessment and comparison of alternative individual automation components.

Developed

- Pavement Management System (PAVER)
- Environmental Technical Information System (ETIS)
- DD Form 1391 Processor
- Building Loads and Systems Thermodynamics (BLAST)
- Commercial Activities System (CAS)
- Assignments and Terminations Module of HOMES
- Geographic Information System (GIS)

Experimental

- Roofing Management System (ROOFER)
- Painting Management System (PAINTER)
- Railroad Management System (RAILER)
- Piping Management System (PIPER)
- Voice Activated Inspection
- Automated Office Requirements Tabulation System (AORTA)
- Voice Operated Information System (VOIS)

Figure 2. USA-CERL-developed and experimental DEH and DEH-related systems.

3 DEH DSS CONCEPT

Definition

USA-CERL has defined a DSS as an interactive computer-based system used personally on an ongoing basis by managers and their immediate staff in direct support of managerial activities and decisions.

The envisioned system will ultimately enable DEH managers to forecast, evaluate alternatives, meet special information requirements, and provide direct access to information systems and analytical models. In addition, personal computing power will be provided for all managers. Almost all functional DEH areas can be supported by DSS applications.

In the broadest sense, most management information systems are also decision support systems, because they provide input which influences decisions. However, to be efficient, the DSS must be able to access all DEH and DEH-related automated systems/programs and, if desired, take information contained within one, or each of the systems, combine it with information from other systems, and format it into a unique graphical display. (The most important automated systems/programs are shown in Figure 3.) Currently, DEH access to these systems is provided by a variety of hardware and software configurations (see Figure 4), requiring knowledge of different passwords and a variety of terminals. Furthermore, it is impossible to electronically gather on one system information from various other automated systems, combine the gathered information, and format the data into a single report. The goal of the DEH DSS is to accomplish this by permitting access to the various automated systems/tools through two terminals--or possibly, only one terminal (see Figure 5).

Within the general context noted above, the DEH DSS is geared to four varieties of applications (see Figure 6). While it is impossible to identify all possible DEH applications, the goal is to identify all possible generic applications so the entire spectrum of DEH functions will be covered. It is expected the four types on Figure 6 will cover most applications experienced by a typical DEH organization. The applications identified are based on a DEH requirements analysis conducted formally at Fort Leonard Wood, MO (Appendix B), and informally at Forts Bliss, TX, Dix, NJ, and Lee, VA.

DSS Components

USA-CERL's DSS concept has four main components:

1. Information (data)
2. Hardware (equipment)
3. Software (applications support analytical models)
4. Telecommunications (access to the variety of systems containing the data).

ARMY VIABLE [ACE/FESA]

IFS-R
HOMES

USACE TYMSHARE [ACE/HND]

DD 1391 Processor
Construction Appropriation Programming, Control & Execution (CAPCES)
Auto Military Progress Reporting System (AMPRS II)

VAX 11/780 UNIVERSITY OF ILLINOIS at URBANA [ACE/USA-CERL]

Commercial Activities System (CAS)
Environmental Technical Information System (ETIS)

FOUR PHASE MICRO [ACE/FESA]

FESS
FEJE
Word Processing
IFDEP

Figure 3. DEH automated systems/programs.

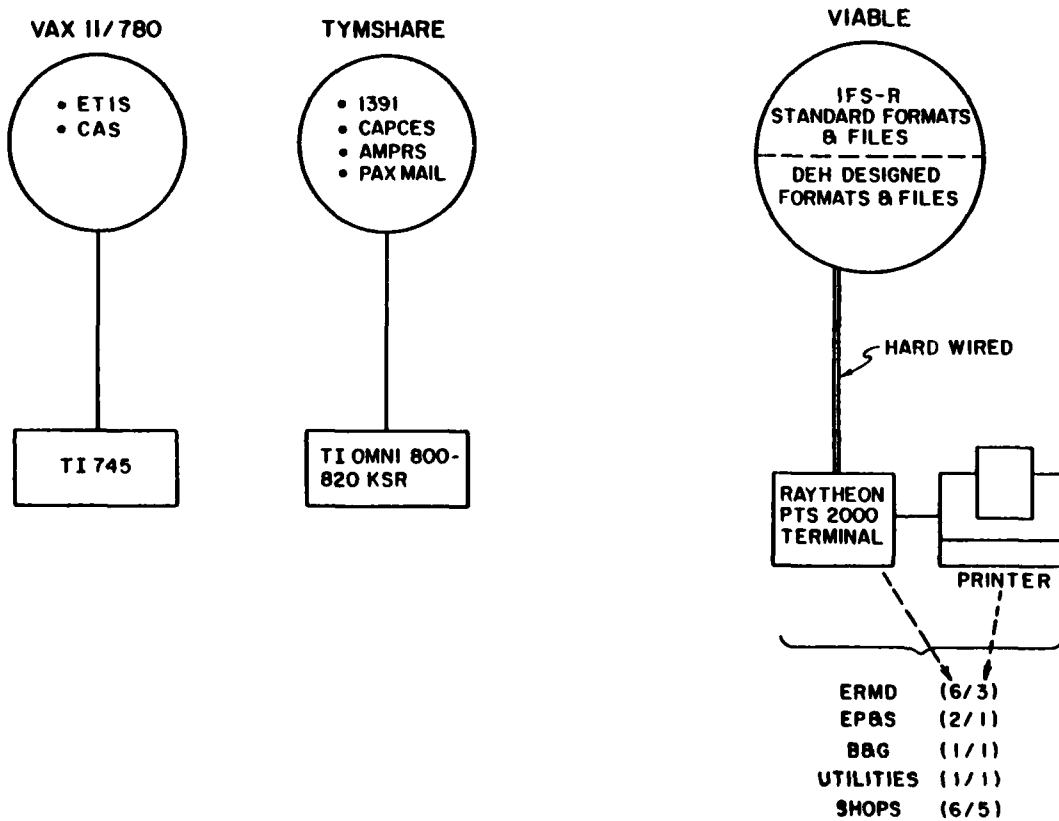


Figure 4. Existing DEH computer support.

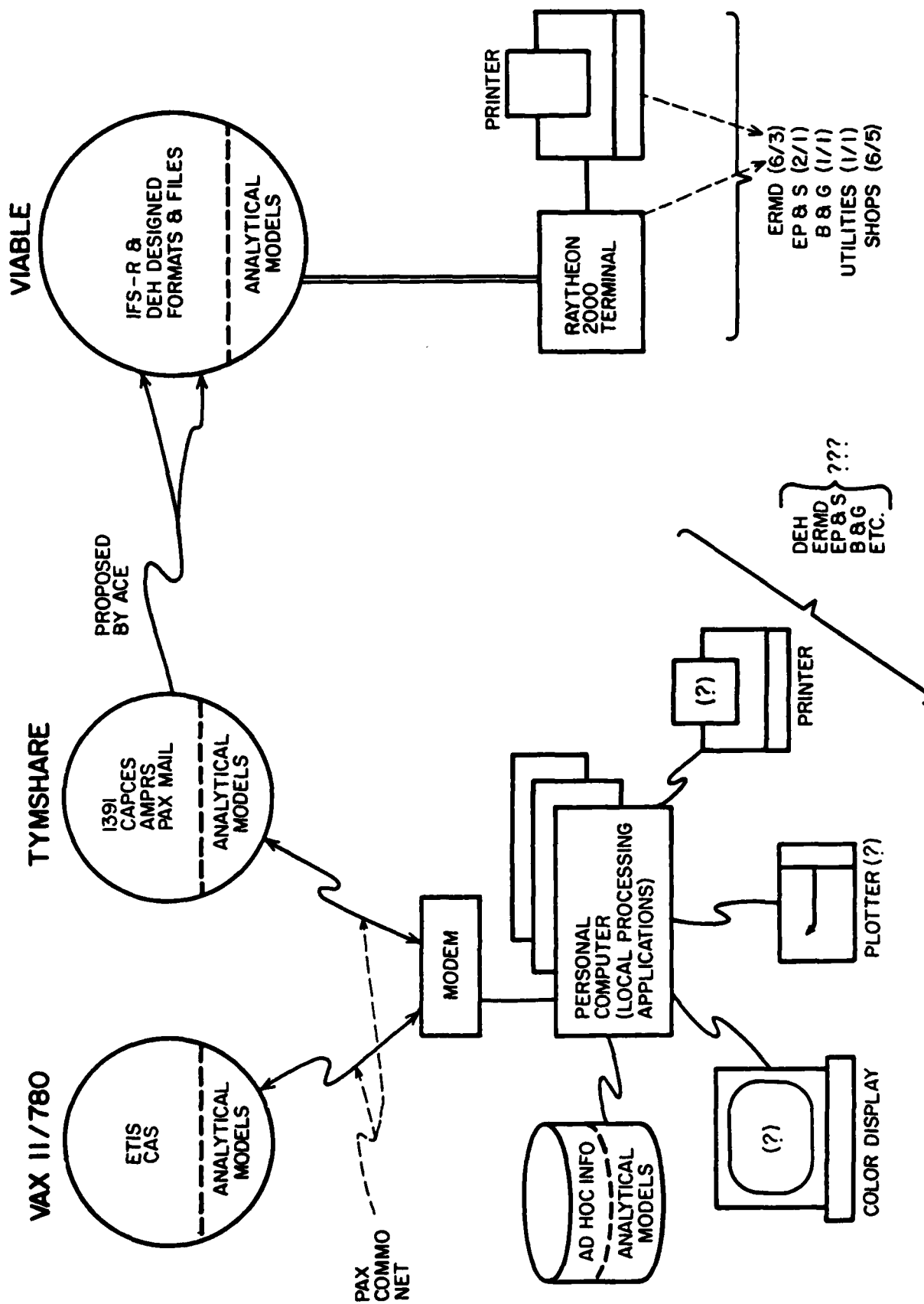


Figure 5. Proposed DEH systems hardware interface.

1. DEH LOCAL APPLICATIONS

- Word Processing/Electronic Spreadsheet/Graphics in support of:

Local analysis of energy data and report generation
Generation of additional facilities data not in present IFS files
Automated tracking and generation of hand receipts and key records
Parts inventory for hospital
Record of preventative maintenance activities for hospital
Automated utility billing and payment status reports
Energy consumption trend analysis
Hospital equipment information/maintenance history
Automated Table of Distribution and Allowances (TDA)
Automated travel module
"L" Account work project tracking
Automated resource management plan
Automation of DEH property book.

- Utilization of off-the-shelf engineering software for engineering design and analysis
- Implementation of stand-alone application programs such as CAS, PAVER, etc. as approved by DA For Micro applications.

2. DEH INTER-LOCAL APPLICATIONS

- File sharing
- Messaging capability
- Resource (printers, plotter, etc.) sharing
- Local Area Network capability.

3. REMOTE COMMUNICATIONS APPLICATIONS

- Access to IFS-R through VIABLE to allow for the submittal and retrieval of IFS data for the creation of local reports.
- Access to other data communications, e.g. TYMSHARE, University of Illinois, VIABLE, for uploading of information in a reliable and cost-effective manner and downloading portions of data files for local (less costly and more efficient) means of analysis.

4. INTER-REMOTE COMMUNICATIONS APPLICATIONS

- Providing the DEH organization with the ability to merge information from several remote sources into a local file for analysis and report generation.

Figure 6. DEH DSS applications.

The major challenge facing DEH DSS developers was to configure adequately the component specifications. This was particularly difficult because of the huge array of hardware and software available for DEH DSS applications. Fortunately, parallel research underway for OACE DSS applications resulted in extensive hardware and software evaluations. Hardware and software chosen were IBM and IBM-compatible, respectively. This was the DEH DSS choice as well. The suitability of selected equipment will be verified during a field test at Fort Leonard Wood.

Information is the database required to support the DSS applications of various DEH branches. The data can be supplied by central processing systems or generated independently by each branch. (IFS-R will provide enough blank files for each installation to permit storage of data not found in existing IFS-R data elements.) Regardless of means, all DEH-related data should be accessible through the DSS. Figure 7 depicts the DEH databases relationship which can support a DEH DSS.

The hardware is the machinery in place at the DEH office. A typical configuration is shown in Figure 8. A further description of parts is included in Appendix C. Most of the proposed hardware is IBM, because of recommendations made in the OACE Office Automation survey, and also because of the superiority of its dealer network, the excellent service support it can provide, the availability of a wide variety of off-the-shelf software, compatibility with most installations' IBM mainframes, and its selection by the VIABLE contractor, EDS, as a high-potential addition to the VIABLE architecture.

Software is the coded instructions which make the hardware manipulate the data in the way desired. Most of the DEH DSS software is off-the-shelf, with very little tailoring required to make it work. The goal is to make DEH managers fully self-sufficient by using available software, which would eliminate the need to have software individually developed. According to the OACE study, all action officers require a common set of software (WP, financial spreadsheet, and graphics). Such software is incorporated into DEH requirements. Analytical models, on the other hand, are problem-solving software routines specifically written for DEH problems, not available off-the-shelf. The demand for analytical models will become apparent during the field test.

Telecommunications is a combination of hardware and software that permits the personal computers (PCs) to communicate with other remote processing installations and other offices for viewing, capturing, or transferring data. The goal of telecommunications support is to enable the DEH to access all DEH-related systems, retrieve information, and process it as desired.

Development Approach

Ordinarily, major systems development efforts begin with identification and quantification of specific functions to automate. The AR 18-1 approach is appropriate for building and fielding Function Oriented Systems (FOS) such as the DD Form 1391 Processor, Specifications Preparation and Text Editing System (EDITSPEC), and GIS, when a specific target function is automated vertically, top to bottom. On the other hand, the AR 18-1 approach seems inadequate for developing decision support systems or other organization-based systems that

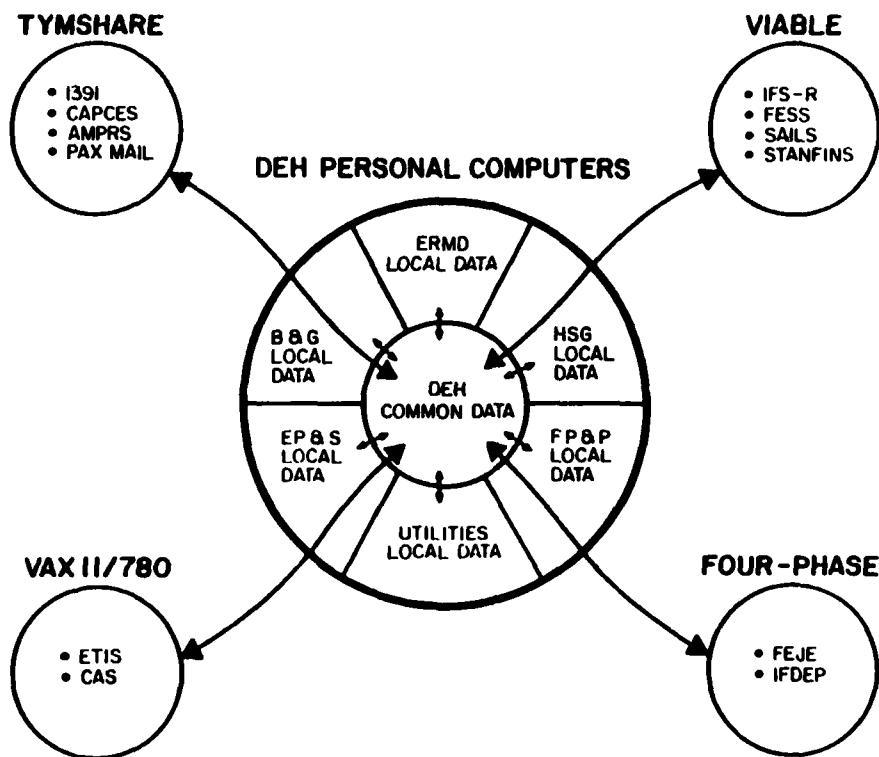


Figure 7. DEH databases relationship.

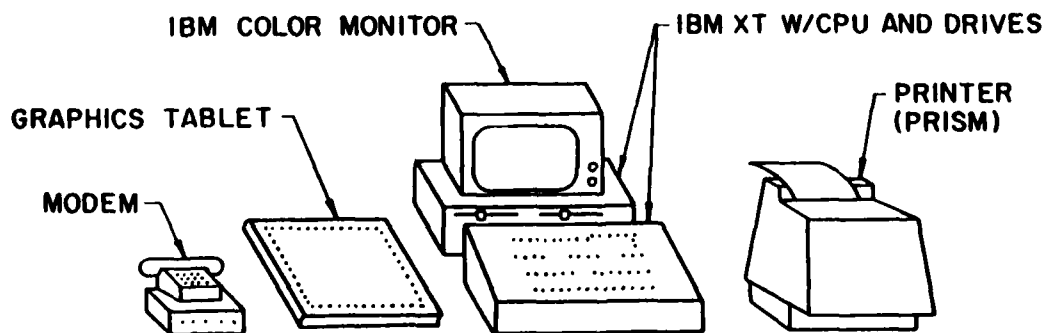


Figure 8. Typical DEH DSS hardware configuration.

involve diverse functions/activities supporting a variety of individuals or organizations.

In DSS development, automation needs are encountered across all functional areas, as well as automation of specific functions. Increasingly stronger demands for interfunctional area automation can best be satisfied by supplementing (or replacing) unintelligent terminals with general-purpose PCs and taking advantage of an abundance of commercially available off-the-shelf software, other automated support equipment, and local area networks (LANs). Nowadays, most DEH offices are aware of their equipment needs and have some (but admittedly few) personnel proficient in personal computer operation. Relatively inexpensive equipment costs favor a three-step development approach to support both FOS and DSS applications.

First, PCs with a common, standard set of general-purpose off-the-shelf software are put into use in target offices, without going through traditional functional requirements analyses. Those offices are then encouraged to help themselves whenever they can, fostering hands-on experience. At the same time PCs are installed in target offices, a third party applications support center is established which provides on-call application assistance to users. The general-purpose software packages will include WP, spreadsheet, graphics, database management, and time management, along with self-training tapes/diskettes for each--which are marketed by many software vendors. The hands-on experience, together with assistance from the support center, will help users define more advanced applications development that researchers will initiate in the third step below.

Second, following PC placement, an LAN is installed. This provides the DEH with PC interoperation capabilities and shared support equipment and facilities such as a high-speed printer, optical character reader (OCR), and plotter. Also, the LAN will be linked to remote host computer systems containing corporate databases. PC users will have a complete communication path for all processing power and equipment connected to the network.

Completion of the above two steps will put into operation the basic, general-purpose hardware/software/communication facilities that will support the target organization across its functional DSS spectrum. Still lacking are special purpose Functional Oriented Systems (FOSs) (e.g., Automated PDB, Automated Master Planning, Space Management System) to which AR 18-1 applies.

In the third step, FOSs will be developed and implemented on top of the general-purpose DSS system already operating at the target organization. FOSs can be designed to draw some data from the in-place PCs, and use the existing hardware/software/communications. Existing FOSs such as PAVER, ETIS, and DD Form 1391 Processor can easily be adjusted to operate well in this environment, with minimal effort. A significant reduction in development time or effort will be possible for FOSs needing no unique hardware or communication considerations.

The specifics of how these three steps will be conducted are explained in the next chapter.

4 DSS DEVELOPMENT ACTIVITIES

As a result of visiting four installations (Forts Dix, Bliss, Lee, and Leonard Wood) in FY83 and assisting Fort Ord, CA, in configuring a DEH personal computer-based network in FY82, USA-CERL researchers concluded that the best development approach is that stated in Chapter 3. Seven development activity groups have been identified and will be pursued during FY84 at Fort Leonard Wood. The activity groups are:

1. Off-the-Shelf Micro Applications
2. Micro Applications of Mainframe-Based Systems
3. Micro-IFS Database Interface Applications
4. LAN Applications
5. DSS Strategic Support Center
6. User Group/Workshop and Technology Transfer
7. Continual New Needs Assessment and Applications Monitoring.

The seven groups can be divided into two major development areas--Technical (groups 1 through 4) and Support (groups 5 through 7).

Technical

Off-the-Shelf Micro Applications

This group has three major activities, all geared to providing divisions within the DEH organization a basic DSS capability via commercially available, off-the-shelf personal computer hardware and software.

Generic Micro Applications. Several generic software packages are required by all DEH divisional elements at all CONUS installations. WP, graphics, financial spreadsheet, and database manager are the four most readily accepted software basics on which more detailed DSS applications are structured. They make up the fundamental data manipulations required to structure, process, and display management information. USA-CERL will provide start-up training in use of off-the-shelf software packages and provide on-call troubleshooting to users.

Extended Off-the-Shelf Applications. To identify and illustrate the versatility of off-the-shelf software, USA-CERL (through user group/workshop meetings) will rank DSS applications which require extensions of off-the-shelf software. Several of the top priority applications will be selected and developed by USA-CERL. For example, IFS data might be downloaded for spreadsheet manipulations.

Also, any other "outside USA-CERL" off-the-shelf software extensions applicable to DEH activities will be evaluated and made available.

Generic Hardware/Software Acquisition. This activity, probably the most important of all, is to develop consistent methodology and justification procedures to permit all DEH organizations to easily acquire generic hardware and software. All avenues will be pursued for securing Army-wide approval for DEH organizations to purchase personal computer hardware and software. Barring this, a sample Technical Bulletin (TB) 18-100,* Appendix I, will be developed and a strategy for acquiring approval reported. The strategy for acquiring approval will include forms for identifying applications, hardware and software needs, and ADPE inventory (tentative sample forms are in Appendix D). Other guidance on configuring a total DEH system and costs will be provided.

Micro Applications of Mainframe-Based Systems

Under this activity, hardware and software will be developed so DEH personnel can access and run mainframe-based system (ETIS, PAVER, DD Form 1391 Processor) applications on personal computers. Communication protocols, common uploading and downloading routines, and peripherals standardization will be featured. Most USA-CERL DEH-developed systems will be designed for use on a personal computer, and as many USA-CERL systems as possible will have uniform operating systems, protocols, and hardware. The USA-CERL DEH DSS steering group will ensure this standardization, by guiding system development activities.

Micro-IFS Database Interface Applications

IFS is the only officially designated primary, and most-used DEH database. Interface between it and the micro-based DEH DSS is essential. Key to successful interface is the generation of a database concept which ensures the integrity of the IFS database yet permits local storage of non-IFS data in DEH divisional PC workstations. Much localized data pertinent only to DEH branches have no business in centralized data files. However, some of this data can be rolled up and formatted in required IFS data elements. With proper interface procedures, this can be done automatically on a PC.

Local Area Network (LAN) Applications

An LAN is a device that connects several types of equipment and applications, permitting high-speed linking of personal computers within the DEH organization. This allows resource sharing, added-value applications, equipment compatibility, distributed processing, and perhaps most important, ease of expansion.

While LAN technologies offer many advantages to organizations using them, there is such a wide variety of offerings, each with such wide divergences of benefits, that comparisons and selection of a best alternative is a research product in itself. Within the Army, the Communications Command is presently

*Technical Bulletin (TB) 18-100, Appendix I, must be prepared to requisition professional workstations (personal computers).

experimenting with LAN configurations at Fort Huachuca, AZ; USA-CERL will evaluate their results for applicability to DEH DSS development. USA-CERL will also let a contract with an LAN expert to:

1. Perform a DEH DSS-LAN requirements analysis
2. Identify shared support equipment
3. Develop a generic LAN configuration/design (including rough costs).

After this contract is completed, an LAN will be installed at the test site.

Support

DSS Strategic Support Center

A DEH DSS Strategic Support Center at the University of Illinois will respond to requests for assistance from DEH organizations. Costs of using this center will be borne by the using agency on a reimbursable basis.

User Group/Workshop and Technology Transfer

The user group/workshop is a key development activity to identify and rank potential applications, and inform DEH personnel of lessons learned by others. Two workshops will be scheduled each year.

Continual New Needs Assessment and Applications Monitoring

This last activity will provide an on-going review of DEH DSS needs and provide the input for user group/workshop meetings. An applications monitoring strategy will be developed by the strategic support center. A contractor, other than the strategic support center, will conduct monitoring activities and disseminate results in a newsletter.

5 CONCLUSIONS AND RECOMMENDATIONS

DEH managers need to have access to the various DEH and DEH-related automated systems through some single piece of hardware. Once access has been established, there are additional needs to copy and manipulate information from the various systems, reformat it into a variety of reports and displays, analyze, and electronically send these reports to other offices within and outside the DEH organization. This must be done without violating the integrity of existing Army automated systems. The mechanism to accomplish this is called a Decision Support System (DSS).

Automated technology (hardware, software, communications) exists today in an off-the-shelf state which can easily meet the above needs, with minor modification. Personal computers, linked together via an LAN and provided with external communications to remote systems, are relatively inexpensive and easy to use. The need is to demonstrate the capability of off-the-shelf products at a DEH organization.

Once the capability has been demonstrated, a generic DSS must be configured and documented. Approvals for Army-wide implementation and procurement should then be secured.

It is recommended that the Army continue development of a DSS. Once statistics are received from the field test at Fort Leonard Wood, individual pieces of equipment and software can be evaluated. Using the field test as a basis, DEH planners can create a flexible DSS model that can be applied (with adaptations) to all Army installations.

APPENDIX A: VIABLE INFORMATION

The agency responsible for fielding VIABLE is the VIABLE Project Management Office (VPMO):

U.S. Army Computer Systems Command
VIABLE Project Management Office (C-170)
Fort Belvoir, Virginia 22060

Commercial: (703) 665-1751
FTS: 544-1751
Autovon: 354-1751

To keep people up-to-date concerning project VIABLE, the VPMO publishes The VIABLE News Bulletin. To receive future issues of the news bulletin, contact Ms. Darlene Thompson at the above VPMO number and ask to be placed on the mailing list.

Systems

The following systems are scheduled to be on the VIABLE network.

HIMS	IAMUS
SAILS	IWARS
ASAC	AESRS
IFS	CABS
ACS	CINFARS
SAAS	PERMARS
FEEMS	
	JAS
	IAVMS
AMUS	ACSRSS
IGMIS	SMMS
MWARS	OESS
DODSASP	VTAADS
ISCAMS	SCIPMIS
MAVMS	MPMIS
FHSS	SIDPERS
MMCSRS	STARCIPS
MPBRs	NAFISS
SCAMS	STANFINS
	STARFIARS
	AMEDDPAS

Questions concerning the systems schedule should be directed to:

Mr. Rudy Autonich
VPMO Engineering Systems Division
Commercial: (703) 664-1751
FTS: 544-6833

Those interested in getting additional systems onto the VIABLE network should request that a new requirement packet be sent to them by contacting:

Mr. Al Ruch
VPMO New Requirements
Commercial: (703) 664-1751
FTS: 544-1751
Autovon: 354-1751

Hardware

Each RDC will have multiple Amdahl 470 CPUs, Storage Technology Corporation disk drives and printers, and NCR Comten front end processors. This hardware will communicate and interface with an IBM 4331 central processor at the local site, which itself will be supporting hundreds of Raytheon terminals (Courier terminals will be used if classified information will be processed). The contract calls for these terminals to be hardwired with no dial-up capability. Additional questions concerning other areas of VIABLE hardware may be directed to:

Mr. Russ Clowdus
Electronic Data Systems
Commercial 703-644-8121
FTS: 202-644-8121

or

Mr. Al Ruch
VIABLE Project Management Office,
Program Management Div.
New Requirements
Commercial: (703) 664-1751
FTS: 544-1751
Autovon: 354-1574

Software

Table A1 is a list of all software that will be on VIABLE to support MACOM and installation efforts.

Installations that have or will have a CPU to handle local interactive processing requirements should make maximum use of the Applied Data Research products listed to avoid complicated conversion efforts and to ensure compatibility between local information systems and the Standard Army Multicommand Management Information System (STAMMIS) when the VIABLE resource is extended to their installation. Organizations

desiring early access to the DATACOM software (compatible with MUS/USE)* should contact:

CDR USACSC
ATTN: ACSC-ESR
Fort Belvoir, VA 22060

*Pentagon Telecommunications Center, Message 171201Z, September 1982 unclassified, from: DA WASH, DC DAMO-C4S-A Subject: VIABLE Software Compatibility.

Table A1

Software Available on VIABLE

(The following list is in the format: Name//Vendor//Program Function).

Telecommunications Software

ROSCOE//ADR//ROSCOE ONLINE EDITOR
JES2/NJE//IBM//NETWORK JOB ENTRY FOR JES2 JOB ENTRY SYS
CICS/VIS//IBM//CICS/VS-ONLINE MONITOR
ACF/VTAM//IBM//ACT VTAM WITH MSNF HOST COMM CONTROL
NCCF//IBM//NCCF-NETWORK COM CONTROL FACILITY
NPDA//IBM//NPDA-NETWORK PROBLEM DETERMINATION
ACF/NCP2//NCR COMTEN//ACT/NETWORK CONTROL PGM
CNS2//NCR COMTEM//COMM NETWORKING SYS
EP4//NCR COMTEN//EMULATION PROCESSING

Regional Data Center Operating System and Utilities

LIBR/VS//ADR//LIBRARIAN/VS-SOURCE LIBRARY MAINTENANCE
AUTOFLOW//ADR//AUTO FLOWCHART PROGRAM *
MCOBOL//ADR//METACOBOL-COBOL PROGRAM CONVERSION
LOOK//ADR//PERFORMANCE MONITOR
DATA/DL//ADR//DATACOM/DL DATALANGUAGE *
DATAC/DB//ADR//DATACOM/DB DATABASE *
DATAC/DD//ADR//DATACOM/DD DATADictionary *
DATAC/DQ//ADR//DATACOM/DQ DATAQUERY *
DATAC/DR//ADR//DATACOM/DR DATAREPORTER *
DATAC/DE//ADR//DATACOM/DE DATAENTRY *
MVS/SEA//AMDAHL//MVS/SE ASSIST
VM/PE//AMDAHL//VM/PRFORMANCE ENHANCEMENT
COBOPT//CAPEX//COBOL OPTIMIZER
DCD-II//CGA COMPASS//DATA CORR & DOC SYS
SAC//EDS//SECURITY ACCESS CONTROLLER
BISORT//EDS//INCORE SORT SUBROUTINEWAAPDSUT//ESI//GENERAL-PURPOSE UTILITY
WAAPSPLT//EDS//REPORT SPLITTER SYS

MVS//IBM//MVS OPERATING SYS
MVS/SE2//IBM/MVS SYS EXTENSIONS
RMF//IBM//MVS RMF-RESOURCE MANAGEMENT
INFO/MVS//IBM//INFO/MVS-TROUBLESHOOTING AID
VM/SP//IBM//VM/SYS PRODUCT
VM/PASS//IBM//BM/CMS PASSTHROUGH FACILITY
VM/IPCSE//IBM//BM/IPCS EXTENDVM/VMAP//IBM/VM/CMS PERF MONITOR
VS/COBOL//IBM//OS/VS COBOL COMPILER
PL/IOPT//IBM//PL/I OPTIMIZED COMPILER
FORTG//IBM//OS FORTRAN IV (G) COMPILER
VS/FORT//IBM//VS FORTRAN COMPILER
FDR/DSF//INNOVATION//DATA/FAST DUMP/RESTORE

*DATACOM software (Compatible with MVS/VSE).

Table A1 (Cont'd)

KOMAND//PACE//BILLING DATA ACQUISITION SYS
 SAS//SAS INST//STATISTICAL ANALYSIS SYS
 VSAM/A//SOFTWARES//VSAM ASSIST UTILITY
 SL/I//THORNE DATA//APPLICATION SYS GENERATOR
 SYNC SORT//WHITLOW//SYSCSORT OS SORTER

Data Processing Installation (DPI) Operating System and Utilities

VSE/AF//IBM//DOS/VSE ADVANCED FUNCTIONS-OPERATING SYSTEM
 VSE/RJE//IBM//DOS/VSE RJE WORKSTATION
 VSE/POWER//IBM//DOS/VSE POWER-SPOOLING PROGRAM
 VSE/DITTO//IBM//VSE/DITTO UTILITYVSE/VSAM//IBM//DOS/VSE VSAM-FILE ACCESS
 METHOD
 VSE/SORT//IBM//DOS/VS SORT MERGE
 VSE/COB//IBM//DOS/VS COBOL COMPILER
 JES/SPT//IBM//HASP-JES2 SPOOL TRANSFER

Those needing more software for use on the VIABLE network should contact:

MAJ Ed Conaster
 DAMO-C4S-A
 FTS # 697-1956
 Autovon: 227-1956
 Commercial: (202) 697-1956

Regional Data Centers

	<u>Regional Data Center</u>	<u>Hardware Delivery Date</u>
RDC 1	Newinton, Virginia	16 Aug 82
RDC 2	Atlanta, Georgia	Nov-Dec 82
RDC 3	Killeen, Texas	3rd Qtr 83
RDC 4	Monterey, California	2nd Qtr 84
RDC 5	Radcliff, Kentucky	4th Qtr 84

Table A2

Data Processing Installation Delivery Schedule

<u>DPI No.</u>	<u>Location</u>	<u>Delivery Date</u>
1	U.S. Army Computer Systems Command	Aug 82
	Headquarters Computer Center	Sep 82
2	U.S. Army Support Group Lee (Fort Lee)	Oct 82
5	Fort McPherson	Oct 82
29	Fort Monroe	Oct 82
25	Health Services Command Headquarters	Nov 82
19	Fort Meade	Jan 83
34	Fort Benning	Apr 83
35	Fort Gordon	May 83
12	Fort Stewart	May 83
26	Fort Detrick	Jun 83
33	Fort Lee	Jun 83
14	Fort Bragg	Jul 83
40	Fort Jackson	Jul 83
31	Fort Belvoir	Aug 83
37	Fort Rucker	Oct 83
18	Fort Sam Houston	Oct 83
17	Fort Hood	Nov 83
36	Fort McClellan	Nov 83
27	Fitzsimmons AMC	Dec 83
21	Fort Riley	Dec 83
9	Fort Polk	Jan 84
43	Fort Sill	Jan 84
16	Fort Carson	Feb 84
30	Fort Leavenworth	Feb 84
24	Fort Clayton (CZ)	Mar 84
28	Walter Reed AMC	Mar 84
32	Fort Eustis	Apr 84
22	Fort Devens	Apr 84
42	Fort Knox	May 84
7	Fort McCoy	May 84
11	Fort Sheridan	Jun 84
39	Fort Dix	Jun 84
4	Fort Ritchie	Jul 84
13	Fort Indiantown Gap	Jul 84
8	Fort Ord	Aug 84
41	Fort Leonard Wood	Aug 84
44	Fort Bliss	Oct 84
47	Fort Irwin	Oct 84
10	Presidio of S.F.	Nov 84
45	Fort Shafter	Nov 84
3	Fort Huachuca	Dec 84
20	Fort Lewis	Jan 85
15	Fort Campbell	Feb 85
38	Fort Ben Harrison	Feb 85
46	West Point	Mar 85
6	Fort Drum	Mar 85
23	Fort Richardson	Apr 85

(In addition to these 47 sites, 23 more DPIs have yet to be selected.)

APPENDIX B: INITIAL DEH DSS APPLICATION REQUIREMENTS--FORT LEONARD WOOD

Fort Leonard Wood initial DEH DSS requirements were generated in three steps. First Fort Leonard Wood personnel developed an overall list of their total ADP requirements (pp 35-40). Second, this list was reorganized by USA-CERL; items were deleted and some new ones added (pp 40-44). From this list USA-CERL evaluated the capability of IFS-R/VIABLE support (pp 45-47). Then, following discussions with USA-CERL personnel, Fort Leonard Wood personnel identified their initial microcomputer requirements (pp 48-52) which could be satisfied through DSS applications.

Immediate ADP Requirements

Acquisition of hardware and implementation of Facilities Engineering Job Estimating System (FEJE).

Acquisition of four or five stand-alone personal computers to run purchased software applications programs. Initial locations will be:

1. Hospital Support Branch of B and G
2. Management Eng. and Systems Branch and Work Management Branch of ERMD
3. Budget/Admin Branch of ERMD
4. Energy Management Branch of EPSD
5. Engineering Services Branch of EPSD.

Word processing system with communication capability to support 1391 Processor System in Environmental and Planning Branch of EPSD.

Stand-alone word processing system for Housing Division

Minicomputer with full database management system to support ARRMAR system. Initial terminal requirements include:

1. Buildings and Grounds Division office
2. Utilities Division office
3. Real Property office
4. Management Engineering and Systems Branch of ERMD.

Minicomputer with full database management system to support Contract Management System. Initial requirement of four to five terminals in Contract Management Branch.

Computer System Functional Capabilities Required

1.* Full database management system with easy-to-use "English-like" query language, interface to DBMS through high-level programming language(s), and report generator.

2. Simple data manipulation/retrieval system ("automated card file").

3. Business programming language capability.

4. Scientific/engineering programming language capability.

5. Spreadsheet system for financial planning and analysis ("VisiCalc").

6. Word processing able to use data from and integrate with other system functions.

7. Create IFS input transactions as byproduct of system operations.

8. Read, store, and manipulate IFS files.

9. Run "canned" engineering applications programs

10. Stand-alone Word Processing system.

11. Single Vendor System (already written and running on particular hardware).

12. Requires specialized non-ADP equipment.

13. Dial-up capability to time-sharing service.

Energy Management Branch Microcomputer

Enter energy usage by month for:

Overall FLW

Reserve Centers

Reimbursable customers (non family housing)

Sampled readings in family housing.

Enter heating/cooling degree-days and miscellaneous energy information from these:

• Prepare billings for utilities customers

• Use reports for Reserve Centers, DEIS II

• Prepare reports/graphs and color transparencies for Commander's Energy Status Report

*See Table B1 for applicability to individual functions.

- Utilization of above data in spreadsheet program to perform economic analysis and "what ifs" for planning projects and policy actions
- Maintain billing/payment records for utilities customers (especially contractors)
- Perform trend analysis on consumption data
- Store historical usage data for analysis (prior FYs, YTD, etc.. [data is available from 1975]).

Estimated file sizes: file sizes and partitioning should be such that system with two 5 1/4-in. (0.134 m) floppy disks (approximately 300 Kbytes each) should provide adequate storage.

Software requirements:

Programming language - Basic
 Spreadsheet*
 File management*
 Graphics*
 Word Processor interfaced to above

*Such as Lotus Development Corporation's "1-2-3"

Hardware requirements:

Microcomputer with 128 Kbytes (or more) RAM
 Two floppy disk drives
 Monochrome monitor
 Color monitor (graphics)
 Low-cost color plotter (HP 7470A)
 Dot matrix printer
 Daisy wheel printer with 10/12 proportional spacing,
 such as DIABLO or QUME

Hospital Support Branch Microcomputer

Internal Service Order (SO) Management System:

- Creates internal SOs keyed to location within hospital
 - Tracks execution of SOs and time spent on each
 - Generates reports (CRT or paper)
- *Backlog of all outstanding SOs sorted appropriately
- *Facility reference to determine status of SOs in given area (both current and completed).

Equipment information/maintenance history:

- Enters all DEH maintained equipment with data about type of equipment maintenance history for past 12 months (both Preventive Maintenance [PM] and other repairs), make, model, location of tech manual, stock numbers of commonly replaced parts
- Interfaces to PM module.

PM Tracking Module:

- Defines recurring PM for different equipment types
 - *Defines work to be done and frequency of performance
 - *Estimates accomplishment time
 - *Lists parts and tools required.
- Merges with equipment file above to create PM work orders for maintenance
- Records accomplishment of work updates maintenance history in equipment file
- Creates report listing manpower and material requirements for any time interval (month, quarter, FY, etc.)
- Creates list of maintenance not accomplished.

Supply System to have:

- Simplified FESS to track supplies stocked and used by Hospital Support Branch Shop
- Data fields similar to FESS (FSN, description, on hand, on order, number used, number of demands, cost, supplier, average order time, unit of issue, unit purchased, reorder point, etc.), plus internal part code number, location, identification of equipment used (if replacement part)
- Inventory quantity adjusted by regular inventory of stock rather than issues of each item
- Capacity to generate information for Purchase Order Requests.

Other future developments:

- In-house hand receipt tracking
- Detailed building subcomponent inventory.

Estimated file sizes:

- SO File: 25 SOs/day * 250 days * 128 bytes/SO = 800 Kbytes
- Equipment Information File: 2500 items * 512 bytes/item = 1.25 Mbytes
- PM File: PM Requirements: 100 types PM x 1 Kbyte each = 100 Kbytes
PM SOs: 2500 items * 10 average PMs/yr * 128 bytes/PM
- 3.125 Mbytes
- Supply File: 4000 parts * 256 bytes/part = 1 Mbyte
- Program & Temp Files: 1 Mbyte
- Total files: 6.5 Mbytes.

Software Requirements:

Programming language (BASIC or PASCAL or other) software
Database manager (DBASEII with supporting software aids)
Word processor that interfaces to Database Manager.

Hardware Requirements:

Microcomputer with 128K or 256K RAM
One 10 Mbyte Winchester disk drive
Two floppy disk drives (double-sided)
Monochrome Monitor
Dot matrix line printer.

Budget/Admin Microcomputer

Admin Functions, Major Files

Table of Distribution and Allowances.

All information contained on TDA: paragraph number, line number (person number), number of requirements, number authorized, actual strength, incumbent identification, Army Management Structure (AMS), position title, authorized grade, actual grade.

Personnel. Data on all DEH personnel such as: name, SSN, date birth, svc comp date, pay plan, grade, AMS, step, job status (perm/temp, etc.), veteran preference, salary, next action due date and type (step increase, promotion, and detail), place of entries of date (historical entries).

Use Files To: Create and track all SF 52s, and to create personnel-related reports (in-house and for TRADOC, 78-RPT, etc.).

Travel Function

Enter all training requests for year and track execution and expenses during year (word processing function).

Budget Function

The following will require spreadsheet, file management, word processing, and graphics capabilities:

- Commitment blotters--ledger-type system to track DEH funds and replace manual system
- Budget status--consolidate detailed budget execution data from STANFINS into spreadsheet system to enable coherent presentation and analysis
- BMAR/DMAR--track all pertinent data from conception through accomplishment.

Software Requirements: word processing, spreadsheet/file/graphics, such as "1-2-3," database system such as DBASEII.

Estimated File Sizes: file sizes and partitioning should be such that systems with two 5 1/4-in. (0.134 m) floppy disks (approx 300 K each) should provide adequate storage.

Hardware Requirements: Once "system" is operational, two, possibly more, microcomputers will be needed. Each will be configured as: microcomputer with 128K or more RAM monochrome display, two floppy disk drives, daisy wheel printer for one system, dot matrix printer for the other system.

ERMD/MES/Work Management Microcomputer

Functions Identified for Implementation

- ARRMAR planning and reports
- Consolidation of data from other systems into Resource Management plan
- Materials coordination and work execution planning
- L-work project tracking.

This system will also be the development system for a good portion of DEH software, so its hardware and software configuration must be compatible with other systems.

Software Requirements

All software packages purchased for use should be purchased for this system also.

Hardware Requirements

- Microcomputer with at least 128 Kbytes RAM
- Two floppy disk drives

- One 10 Mbyte Winchester disk drive
- Monochrome monitor
- Dot matrix printer
- Color monitor for graphics (optional).

Engineering Plans and Services Microcomputer

Fort Leonard Wood DEH has only limited information on available engineering software for "desk top" computers and does not know about the quality of the products.

The following immediate needs have been identified by the engineers:

- Residential/Commercial HVAC design (heat/cool load, duct design, fuel cost, life-cycle cost)
- Fire sprinkler grid system design
- Electrical design (lighting, fault analysis)
- Concrete design
- Load design--beam, truss
- Piping design and sizing.

Ft. Leonard Wood ADP Requirements

ADP Reqmt.
Number

Engineering Resources Management Division (ERMD)

- | | |
|--|---|
| 1. Work Management Branch | |
| Preparation of resource management plan (RMP) | |
| Word processing and spread sheet (VisiCalc) | 1 |
| Access to IFS data base for planning and analysis of job and workload data | 2 |
| Generation of useful work management reports from IFS | 3 |
| Ad hoc inquiry into DBMS | |
| Generation of locally developed "canned" reports | |
| 2. Management Engineering and Systems Branch (MES) | |
| Analysis and reduction of data from IFS for management studies, productivity studies, etc. | 4 |
| Responsibility for DEH ADP development, implementation and operation | 5 |

	ADP Reqmt. Number
3. Supply Branch	
Automation of DEH property book	6
Enhancement to FESS--Four Phase Systems Hardware	7
4. Budget/Admin Branch	
Automation of DEH account ledgers	8
Automation of personnel roster, other personnel data, with capability to interface with word processing system to generate personnel action paperwork, travel orders, reports, etc.	9
Spread sheet system (VisiCalc) to do budget planning, projection, analysis, "what if's"	10
5. Planning and Estimating Branch	
FEJE--Wang hardware	11

Engineering Plans and Services Division

1. Engineering Plans Branch	
Utilization of canned engineering software for engineer- ing design and analysis (heating/cooling load, truss/beam design, etc.). Also FORTRAN or BASIC programming for in-house program development.	12
Indexing system for engineering drawings with possible future conversion to microform storage and/or computer aided drafting.	13
Automate survey operations-EDM unit with computer and plotter	14
Pollution Abatement Alternative Technology Selection	C-1
2. Energy Management Branch	
Spread sheet system (VisiCalc) for analysis of energy utilization data and report generation	15
Inquiry into IFS data base for analysis of energy- related facility data	16
Energy Management System	C-2
3. Contract Inspection Branch	
See attached information on Contract Management System	17
Commercial Activities System	C-3
Voice Activated Inspection	C-4
4. Environmental and Planning Branch	
Environmental Program Management	
Dial-up access to Army environmental data base (share with 1391 processor system)	18
Geographic Information System	C-5
Forest Growth Model	C-6
National Pollutant Discharge Elimination System	C-7
Hazardous Materials Management System	C-8
Air Systems	C-9

	<u>ADP Reqmt. Number</u>
Master Planning Branch	
Improved automation of "1391" system--see attached information	19
Analysis and reduction of IFS facilities data	20
Automated generation, update, storage and retrieval of project data and documentation for construction (MCA) projects	21
Space Utilization System	C-10
Real Property Office	
Access to facilities from IFS, inquiry and report generation	22
Generate and store additional facilities data not in present IFS data files	23
Automate tracking and generation of hand receipts and key records for facilities	24
<i>Housing Division</i>	
Word Processing System	25
<i>Buildings and Grounds Division (B&G)</i>	
See Information on ARRMAR system	26
PAVER	C-11
Voice Activated Inspection	C-4
Hospital Branch	
Internal work tracking	27
Equipment P.M. scheduling and tracking	28
Parts Inventory	29
Entomology Branch	
Pesticide Management System	C-12
<i>Utilities Division</i>	
See information on ARRMAR system	
PIPER	C-13
<i>Self Help Store</i>	
Automate Inventory and Issues	

ADP Reqmt.
Number

Organization Wide

Graphics

Electronic Mail/Messaging/Suspense

Calendar/Meeting scheduler

Table B1

Matrix of ADP Requirements Vs. System Functional Capabilities

ADP REQUIREMENT	ADP CAPABILITY--->													IMMEDIATE STAND-ALONE APPLICATION	IMMEDIATE DBMS APPLICATION	FUTURE DBMS APPLICATION	WITH ARMMAR DBMS APPLICATION
	A	B	C	D	E	F	G	H	I	J	K	L	M				
1 Resource mgmt plan	X			X	X									X			X
2 RMP access to IFS files	X							X						X			X
3 New Work Mgmt info from IFS	X		X					X						X			X
4 Mgmt analysis rpts from IFS	X		X					X						X			X
5 ADP development for DEH	X	X	X	X	X	X		X	X					X			X
6 Automate DEH property book	X	X	X											X			X
7 Enhancements to FESS/IFDEP																	
8 Automate budget ledgers		X	X		X						X			X			
9 Automate personnel data		X	X		X	X								X			
10 Budget financial planning		X	X		X									X			
11 FEJE-automated job estmt.														X			
12 Engineering design applications				X					X					X			
13 Automated drafting/drawings	?	?										?		?			
14 Automate survey operations												X		?			
15 Spread sheet for energy rpts		X			X									X			
16 Energy analysis of IFS data														X			
17 Contract Management System	X		X					X						X-or-X			X
18 Access to envir. data system	X													X-or-X			
19 1391 Processor system	(see #19)													X			
20 Master plan analyze IFS data	X					X		X					X	X			X
21 Automate MCA project files	X	X				X								X			X
22 Real property access to files	X							X						X			X
23 Automate present card files	X													X			X
24 Automate prop hand receipts	X													X			X
25 Word processor for housing	X													X			
26 ARMMAR System	X	X	X	X	?									X			X
27, 28, 29 Hospital System														X			

Table B2

Comparison of IFS-R, VIABLE Capabilities

	IFS-R SUPPORT	VIABLE	COMMENTS
I. Engineering Resources Management Division (ERMD)			
A. Work Management Branch			
* Preparation of resource management plan (RMP)	N	P*	*Note: VIABLE ADPE and its associated software could undoubtedly support all automated applications marked P. However, the time required for applications approval and transition would be lengthy, cost of development and running would be large, flexibility of individual changes to software would be lost and storage capacity for each installation may prohibit residency of many of the DER applications on VIABLE.
-word processing and spread sheet (VisiCalc)	N	N	
-access to IFS data base for planning and analysis of job and workload data.	Y	Y	
* Generation of useful work management reports from IFS	Y	Y	
-ad hoc inquiry into DHMS	Y	Y	
-generation of locally developed "canned" reports	Y	Y	
B. Management Engineering and Systems Branch (MES)			
* Analysis and reduction of data from IFS for management studies, productivity studies, etc.	Y	Y	
* Responsibility for DER ADP development, implementation and operation	NA	NA	
C. Supply Branch			
* Automation of DER property book	N	P	
* Enhancement to FESS-Four Phase Systems Hardware	NA	NA	
D. Budget/Admin Branch			
* Automation of DER account ledgers	N	P	
* Automation of personnel roster, other personnel data, with capability to interface with word processing system to generate personnel action paperwork, travel orders, reports, etc.	N	P	
* Spread sheet system (VisiCalc) to do budget planning, projection, analysis, "what if's"	N	P	
E. Planning and Estimating Branch			
* FEJE--Wang hardware	NA	NA	
II. Engineering Plans and Services Division			
A. Engineering Plans Branch			
* Utilization of canned engineering software for engineering design and analysis (heating/cooling load, truss/beam design, etc.) Also FORTRAN or BASIC programming for in-house program development.			

KEY: Y=Yes, N=No, P=Potential exists

Table B2 (Cont'd)

	IFS-R SUPPORT	VIABLE	COMMENTS
* Indexing system for engineering drawings with possible future conversion to microform storage and/or computer aided drafting. * Automate survey operations--EDM unit with computer and plotter * Pollution Abatement Alternative Technology Selection	N N	N N	1. VIABLE does not provide a graphics capability. 2. All systems developed by USA-CERL Environmental Division are written primarily in C language, utilizing the UNIX operating system. VIABLE does not support this operating system.
B. Energy Management Branch * Spread sheet system (VisiCalc) for analysis of energy utilization data and report generation * Inquiry into IFS data base for analysis of energy-related facility data * Energy Management System	N Y	P Y	
C. Contract Inspection Branch * See attached information on Contract Management System * Commercial Activities System * Voice Activated Inspection	Y ? N	Y N N	
D. Environmental and Planning Branch 1. Environmental Program Management * Dial-up access to Army environmental database (share with 1391 processor system) * Geographic Information System * Forest Growth Model * National Pollutant Discharge Elimination System * Hazardous Materials Management System * Air Systems	N N N N N N	N N N N N N	3. VIABLE does not provide remote access to other systems. See Comment 2. See Comment 2. See Comment 2. See Comment 2. See Comment 2.
2. Master Planning Branch * Improved automation of DD Form 1391 Processor--see attached information * Analysis and reduction of IFS facilities data * Automated generation, update, storage, and retrieval of project data and documentation for construction (MCA) projects * Space Utilization System	N Y N Partial	N Y N N	See Comment 3. Only gross sqmts, no analysis capability.
3. Real Property Office * Access to facilities data from IFS, inquiry and report generation * Generate and store additional facilities data not in present IFS data files * Automate tracking and generation of hand receipts and key records for facilities	Y N N	Y P P	

Table B2 (Cont'd)

		IFS-R SUPPORT	VIABLE	COMMENTS
III.	Housing Division * Word Processing System	N	N	4. VIABLE does not provide word processing.
IV.	Buildings and Grounds Division (B&G) * See Information on ARMMAR system, Table B1 * PAVER * Voice Activated Inspection	N N N N	P N N N	
	Hospital Branch * Internal work tracking * Equipment P.M. scheduling and tracking * Parts Inventory	N N N N	P P P P	
	Entomology Branch * Pesticide Management System	N	N	
V.	Utilities Division * See information on ARMMAR system, Table B1 * PIPER	N N	P P	
VI.	Self Help Store * Automate Inventory and Issues	N	P	
VII.	Organization Wide * Graphics * Electronic Mail/Messaging/Suspense * Calendar/Meeting scheduler	N	N	

APPENDIX C: HARDWARE/SOFTWARE CONFIGURATION

As a result of initial microcomputer requirements identified jointly by USA-CERL and Fort Leonard Wood, the following personal computer hardware/software needs were identified for each DEH division, branch or section (see Tables C1 through C8).

Table C1

Energy Management Branch Microcomputer

<u>Item</u>	<u>Quantity</u>	<u>Make of Micro System</u>	<u>Purchase Price</u>	<u>Description</u>
1.	1	IBM PC	1,924.00	Intel 8088; 16 bit; 64 KB RAM 320 KB DSDD Diskette
2.	3	64 KB RAM	480.00	Memory Expansion to 256 KB RAM
3.	1	320 KB Diskette	520.00	Second DSDD Drive
4.	1	IBM Color Monitor	680.00	25 lines of text 80 char/line
5.	1	Monitor Adapter	240.00	1 I/O slot
6.	1	Dot Matrix Printer	476.00	132 char/line 80 cps
7.	1	Printer Cable	44.00	
8.	1	Printer Stand	44.00	
9.	1	Daisy Printer	2,000.00	NEC 3550 or Equivalent
10.	1	HP 7470A Plotter	1,550.00	8.5 x 11 in. 2 Pen
11.	1	Asynch Adapter	120.00	1 I/O slot for plottter
12.	1	Adapter Cable	60.00	RS 232-C
TOTAL			8,138.00	

Table C2

Energy Management Branch Microcomputer Enabling Software

<u>Item</u>	<u>Product</u>	<u>Description</u>	<u>Price</u>
1.	DOS 2.0	DOS and BASIC	60.00
2.	1-2-3	1. Information Management 2. Spreadsheet 3. Graphics - Concurrent	495.00
3.	Wordstar	Word processor - No WP in 1-2-3	495.00
TOTAL			1,050.00

Table C3

Hospital Support Branch Microcomputer

<u>Item</u>	<u>Quantity</u>	<u>Make of Micro System</u>	<u>Purchase Price</u>	<u>Description</u>
1.	1	IBM PC XT	4,995.00	256 KB RAM, 10 MB hard disk 360 KB Diskette
2.	1	Monochrome Display	276.00	25 lines/screen 80 char/line
3.	1	Display Adapter	268.00	1 I/O slot
4.	1	Dot Matrix Printer	476.00	132 char/line 80 cps
5.	1	Printer Cable	44.00	
6.	1	Printer Stand	44.00	
TOTAL			6,103.00	

Table C4

Hospital Support Branch Microcomputer Enabling Software

<u>Item</u>	<u>Product</u>	<u>Description</u>	<u>Price</u>
1.	DOS 2.0	DOS and BASIC	60.00
2.	dBASE II	Assembly language relational database	700.00
2a.	DBPlus	Sort, compress, transform dBASE II files	125.00
2b.	dGRAPH	Graphics system for dBASEII	295.00
2c.	dUTIL	dBASE II documentation. Converts comments and variables to lower case, indents, checks for matching	99.00
2d.	QUICKCODE	dBASE II program generator	295.00
3.	Wordstar	Word processor interfaces with dBASE II	495.00
TOTAL			2,069.00

Table C5

Budget/Admin Microcomputer

<u>Item</u>	<u>Quantity</u>	<u>Make of Micro System</u>	<u>Purchase Price</u>	<u>Description</u>
1.	1	IBM PC	1,924.00	Intel 8088; 16 bit; 64KB RAM 320 KB DSDD Diskette
2.	3	64 KB RAM	480.00	Memory Expansion to 256 KB RAM
3.	1	320 KB Diskette	520.00	Second DSDD Drive
4.	1	Monochrome Display	276.00	25 lines/screen 80 char/line
5.	1	Monitor Adapter	240.00	1 I/O slot
6.	1	Printer Cable	44.00	
7.	1	Printer Stand	44.00	
SUBTOTAL			3,528.00	
8.	1	Dot Matrix Printer	476.00	132 char/line 80 cps
CONFIGURATION 1			4,004.00	
8a.	1	Daisy Wheel Printer	2,000.00	NEC 3550 or equivalent
CONFIGURATION 2			5,528.00	

Table C6

Budget/Admin Microcomputer Enabling Software

<u>Item</u>	<u>Product</u>	<u>Description</u>	<u>Price</u>
1.	DOS 2.0	DOS and BASIC	60.00
2.	1-2-3	1. Information Management 2. Spreadsheet 3. Graphics - Concurrent	495.00
3.	dBASE II	Assembly language relational database	700.00
3a.	DBPlus	Sort, compress, transform dBASE II files	125.00
3b.	dGRAPH	Graphics system for dBASE II	295.00
3c.	dUTIL	dBASE II documentation. Converts comments and variables to lower case, indents, checks for matching	99.00
3d.	QUICKCODE	dBASE II program generator	295.00
4.	Wordstar	Word processor interface with dBASE II	495.00
TOTAL			2,564.00

Table C7

ERMD/MES/Work Management Microcomputer

<u>Item</u>	<u>Quantity</u>	<u>Make of Micro System</u>	<u>Purchase Price</u>	<u>Description</u>
1.	1	IBM PC XT	4,995.00	256 KB RAM, 10 MB hard disk 360 KB Diskette
2.	1	IBM Color Monitor	680.00	25 lines/screen 80 char/line
3.	1	Monitor	240.00	1 I/O slot
4.	1	Dot Matrix Printer	476.00	132 char/line 80 cps
5.	1	Printer Cable	44.00	
6.	1	Printer Stand	44.00	
TOTAL			6,479.00	

Table C8

ERMD/MES Work Management Microcomputer Enabling Software

<u>Item</u>	<u>Product</u>	<u>Description</u>	<u>Price</u>
1.	DOS 2.0	DOS and BASIC	60.00
2.	1-2-3	1. Information Management 2. Spreadsheet 3. Graphics - Concurrent	495.00
3.	dBASE II	Assembly language relational database	700.00
3a.	DBPlus	Sort, compress, transform dBASE II files	125.00
3b.	dGRAPH	Graphics system for dBASE II	295.00
3c.	dUTIL	dBASE II documentation. Converts comments and variables to lower case, indents, checks for matching	99.00
3d.	QUICKCODE	dBASE II program generator	295.00
4.	Wordstar	Word processor interfaces with dBASE II	495.00
TOTAL			2,564.00

APPENDIX D: DEH DSS SURVEY FORMS

The following forms originated from work in the OACE office automation study. Although developed for an office with functions and responsibilities different from a DEH organization, their design was specifically made generic to accommodate any Army office evaluation study. Six forms are presented:

DEH Automation Survey--applications other than word processing

DEH Automation Survey--word processing applications

DEH Automation Survey--suggested workstation layout and interactions

DEH ADPE inventory worksheet

DEH summary workstation requirements worksheet

Workstation requirements symbols.

INTERVIEWEE/OFFICE/BLDG _____
USER(S)/OFFICE(S) _____

USAGE

Do you currently use a terminal? (Y or N) _____
Name _____ Location _____
Could you use a terminal if you have not used one? (Y or N) _____
What do or would you use it for? _____

Could or would your terminal be used by others? (Y or N) _____

PROCESSING REQUIREMENTS

What kinds of data processing/manipulations are you required to make?

What is the frequency and volume of processing/manipulating? _____

UTILITY SOFTWARE REQUIREMENTS

Do you know of any software utilities you need? _____

What personal computer operating system would you like? _____

What programming languages would you like? _____

Would you like a graphics capability? (Y or N) _____

Are you required to make slides or viewgraphs? (Y or N) _____

STORAGE REQUIREMENTS

What kind and quantities of information do you store? _____

PRINTING REQUIREMENTS

What type of documents are you required to print? _____

Print Quality (R=Readable, G=Good, C=Correspondence, L=Letter) _____

Characters/Inch _____

Speed: Lines/Minute _____ Characters Wide _____

Feed (F=Friction, T=Tractor, S=Single Sheet) _____

Graphics? (Y or N) _____ Color? (Y or N) _____

PLOTTERS REQUIREMENTS

What type of document are you required to plot? _____

CATHODE-RAY-TUBE DISPLAY REQUIREMENTS

Would you like a cathode-ray-tube display device? (Y or N) _____

Number of: Lines _____ Characters/Line _____

COMMUNICATIONS REQUIREMENTS

To what locations/ADP systems do you need access? _____

What kinds of information do you want to receive or send? _____

Remote Processing Required? (Y or N) _____

Military Security? (N=None, C=Confidential, S=Secret or Higher) _____

Figure D1. DEH Automation Survey--applications other than word processing.

INTERVIEWEE/OFFICE _____
USER(S)/OFFICE(S) _____

USAGE

Could you use a word processor if you do not currently? (Y or N) _____
What functions or types of documents would you use it for? _____

If you had a terminal, could it be used by others? (Y or N) _____
What percent of your time would be spent performing word processing? _____

WORD PROCESSOR REQUIREMENTS

What is your estimated annual volume of printed pages? _____
Do you have a need for remote transmission of documents? _____
To another word processor or data center? (Y or N) _____
To a line printer? (Y or N) _____
Do you need an arithmetic (+, -, x, /) capability? (Y or N) _____
What print pitch(es) do you need? _____
What percentage of your printouts require:
letter quality? _____
correspondence quality? _____
draft quality? _____
What types fonts do you need?
Prestige Elite? (Y or N) _____
Italics? (Y or N) _____
Mathematical Symbols? (Y or N) _____
Other _____
Does any of your typing have a military security classification? (Y or N) _____

Figure D2. DEH Automation Survey--word processing applications.

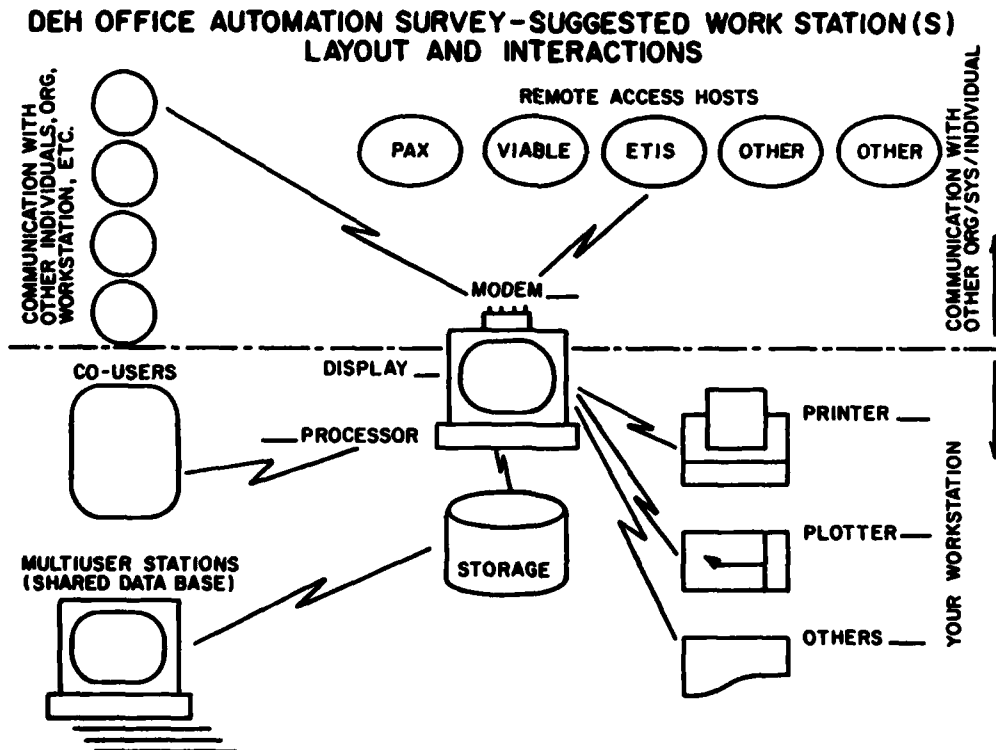


Figure D3. DEH Automation Survey--suggested workstations layout and interactions.

Office:

Hardware

Basic System Hardware

Nomenclature _____

Memory (Kilobytes) _____

Random-Access Memory _____

Read Only Memory _____

Peripherals

Disc Drives

Type

		Hard	
	Floppy	Fixed	Remov.

Diameter (in.) _____

Density (S=Single, D=Double) _____

Sides (1 or 2) _____

Kilobytes/Side _____

Number of Drives _____

Controller _____

Direct Memory Access? (Y or N) _____

No. Add'l Discs Allowed _____

Recording Format _____

Hard or Soft Sector (H or S) _____

Multiple Formats Allowed? (Y or N) _____

Explain _____

Printers

Manufacturer _____

Model Number _____

Printer Element _____ (T=Thermal, M=Matrix, D=Daisy, B=Ball, C=Chain/Belt)

Type Ball or x-y Matrix Size _____

Characters/Inch _____

Speeds: Lines/Minute _____ Characters Wide _____

Quality _____ (R=Readable, G=Good, C=Correspondence, L=Letter)

Feed _____ (T=Tractor, S=Single Page, F=Friction)

Graphics _____ (x-y Resolution or Blank)

No. Multiple Copies Possible _____

Computer Interface Type _____ (P=Parallel, S=Serial)

Terminals

Manufacturer _____

Model Number _____

Cathode-Ray-Tube? (Y or N) _____

Detachable Keyboard? (Y or N) _____

Display Color _____ (B=Black and White, G=Green, A=Amber, O=Other)

Graphics _____ (x-y Resolution or Blank)

Number of Lines _____

Number of Character Columns _____

Communication Rate Range (Baud) _____

Number of Function Keys _____

"Smooth Scroll"? (Y or N) _____

Terminal Status Line? (Y or N) _____

Figure D4. DEH ADPE inventory worksheet.

Hardware (Cont'd)

Peripherals (Cont'd)

Plotters

Communication Speed (Increments/Sec.) _____
Fast Skew? (Y or N) _____
Plot Area Size (Length x Width, Inches) _____
Multiple Pens? (Y or N) _____
Plotter Type _____ (F=Flat Bed, D=Drum, O=Other)
Computer Interface Type _____ (P=Parallel, S=Serial)

Modems

Manufacturer's Name _____
Model No. _____
Speeds (Baud) _____
Auto-dial? (Y or N) _____
Auto-answer? (Y or N) _____

System Software

Operating System

Nomenclature _____
Version _____

Programming Languages Available (List Language Name, Vendor Name, Version)

Utilities

Source Editor _____
File Transfer Program (e.g., P.I.P.) _____
Assembler _____
Loader _____
Linkage Editor _____
Menu-driven Interface to Operating System (e.g., SUPERVYZ) _____
Other _____

Application System Software (List Name and Version)

Data Base Management System (DBMS) _____
Electronic Spread-sheet _____
Word Processing Program _____
Spelling Checking Supported? (Y or N) _____
Correctly Configured for the System's Printer? (Y or N) _____
Other _____
Other _____

Locally Written Application Software (Title, Language, File Sizes, Utility Programs Used)

Hardware Utilization

Frequency in Sessions/Day _____
Frequency in Percent of 8-hour Workday _____

Cost per Month

Hardware/Software _____ (Include Modem, Telephone...)
Maintenance _____

Figure D4. (Cont'd).

WORK STATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FUNCTION															
LOCATION															
Office															
Room															
Area															
COMPONENTS															
Keyboard															
CRT (chars)															
Printer (chars)															
Quality															
Element															
Modem															
Processor															
Main Memory (KB)															
Disc (MB)															
SUPPORT HARDWARE															
Interoffice Comm															
Processor															
Main Memory															
Hard Disc															
Modem															
Fast Printer															
Sheet Feeder															
Plotter (size)															
Graphics Printer															
Viewgraphs															
2"x2" Slides															
Microfiche															
OCR															
SUPPORT SOFTWARE															
Operating System															
Word Processing															
Spread Sheet															
DBMS															
Statistics															
Network Analysis															
Graphics															
Time Management															
Compilers															
USERS															

Figure D5. DEH summary workstation requirements worksheet.

FUNCTION

P = Professional computer (intelligent, programmable terminal with main [primary] memory, and usually, secondary [disc, floppy or hard] memory)
U = Unintelligent terminal
W = Word Processor terminal
G = Graphics terminal

LOCATION

Office Branch and section symbols
Room Last three digits (e.g., 219 for Pulaski Bldg, Room 2219)
Area First and last initials of nearest employee, or
Vac for vacant position, or
Con for contractor employee, or
Comp for computer room, or
Ent for entrance

COMPONENTS

Printer

Quality

R = Readable
G = Good
C = Correspondence
L = Letter

Element

T = Thermal
M = Matrix
D = Daisy wheel
B = Ball
C = Chain or Belt Driven

SUPPORT HARDWARE

Plotter (size)

S = Small 8½" x 11"
M = Medium 11" x 17"
L = Large 28" x 40"

SUPPORT SOFTWARE

Operating System

DOS = Disc Operating System
TRS = Tandy Radio Shack DOS
CP/M = Control Program for Microprocessors

DBMS (none, one, or more than one of the below)

F = FOCUS
X = General purpose

Compilers (none, one, or more than one of the below)

B = Basic
F = FORTRAN
C = COBOL
P = Pascal
p = UCSD p-System

USERS

First and last initials of employee, or
Vac for vacant position, or
Con for contractor employee, or
Other for other, or
Gen Use for general use (add Port for portable)

Figure D6. Workstation requirements symbols.

LIST OF ABBREVIATIONS

AA	Assets Accounting
ACE	Assistant Chief of Engineers
ADP	Automated Data Processing
ADPE	Automated Data Processing Equipment
AMO	Automation Management Office
AMPRSII	Automated Military Progress Reporting System
AORTA	Automated Office Requirements Tabulation System
BASOPS	Base Operations
BLAST	Building Loads and Systems Thermodynamics
CAPCES	Construction Appropriations, Programming, Control, and Execution System
CAS	Commercial Activities System
CONUS	Continental United States
CPU	Central Processing Unit
DA	Department of the Army
DARCOM	Development and Readiness Command
DBMS	Data Base Management System
DEFI	Data Entry File Inquiry
DEH	Directorate of Engineering and Housing
DPI	Data Processing Installation
DSS	Decision Support System
EDITSPEC	Specifications Preparation and Text Editing System
EDS	Electronic Data Systems
EP&S	Engineering Plans and Services
ETIS	Environmental Technical Information System
FEJE	Facilities Engineering Job Estimating System
FEMS	Facilities Engineering Management System
FESA	Facilities Engineer Support Agency
FEES	Facilities Engineering Supply System
FOS	Functional Operating System
GIS	Geographic Information System
HND	U.S. Army Engineer Division, Huntsville
IBM	International Business Machine
IFDEP	Integrated Facilities Data Entry Process
IFS	Integrated Facilities System
IFS-R	Integrated Facilities System-Redesign
IJO	Individual Job Order
LAN	Local Area Network
MACOM	Major Army Command
OACE	Office of the Assistant Chief of Engineers
OCE	Office of the Chief of Engineers
OCR	Optical Character Reader
PAINTER	Painting Management System
PAVER	Pavement Management System
PIPER	Piping Management System
PM	Preventive Maintenance
PPBER	Planning, Programming, Budgeting and Execution Review
PC	Personal Computer
RAILER	Railroad Management System
RDC	Regional Data Center
ROOFER	Roofing Management System

RPMA	Real Property Maintenance Activities
SAT	Software Acceptance Testing
STAMMIS	Standard Army Multicommand Management Information System
SO	Service Order
TDA	Table of Distribution and Allowances
TRADOC	Training and Doctrine Command
USA-CERL	U.S. Army Construction Engineering Research Laboratory
USACSC	U.S. Army Computer Support Command
VIABLE	Vertical Installation Automation Baseline
VOIS	Voice Operated Information System
VPMO	VIABLE Project Manager Office
WP	Word Processing

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